Amendments to the Claims

Please amend claims 1, 12-13, and 45 and cancel claims 23-44 as follows:

1. (Currently Amended) An I-PVD source comprising:

a) a chamber for containing a feed gas;

b) a plurality of anode sections that are concentrically positioned in the chamber;

c) a segmented magnetron cathode comprising a plurality of concentrically positioned magnetron cathode segments that are positioned in the chamber proximate to the concentrically positioned anode sections so that a respective one of the plurality of anode sections is positioned adjacent to a respective one of the plurality of magnetron cathode segments, each of the plurality of concentrically positioned magnetron cathode segments being electrically isolated from each of the other concentrically positioned magnetron cathode segments;

d) a switch having an electrical input and a plurality of electrical outputs, a respective one of the plurality of electrical outputs being electrically connected to a respective one of the plurality of magnetron cathode segments; and

e) a power supply having an electrical output that is electrically connected to the electrical input of the switch, the power supply generating a train of voltage pulses that ignites and sustains a plasma comprising metal ions from the concentrically positioned magnetron cathode segment material and the feed gas, individual voltage pulses in the train of voltage pulses being routed by the switch in a predetermined sequence to at least two of the plurality of magnetron cathode segments and at least one of a rise time, amplitude, pulse duration, fall time, and pulse shape of at least some of the voltage pulses in the train of voltage pulses being chosen to increase the generation of metal ions.

2. Canceled.

3. Canceled.

4. (Original) The plasma source of claim 1 wherein the anode comprises at least one gas injector.

5. (Original) The plasma source of claim 1 wherein at least one of the plurality of magnetron cathode segments comprises sputtering target material.

6. (Original) The plasma source of claim 1 wherein at least one of the magnetron cathode segments comprises a target material that is different from a target material of another one of the magnetron cathode segments.

7. (Original) The plasma source of claim 1 wherein the plurality of magnetron cathode segments comprises a hollow cathode magnetron.

8. (Original) The plasma source of claim 1 wherein each of the plurality of magnetron cathode segments is positioned in a unique horizontal plane.

9. (Original) The plasma source of claim 1 wherein each of the plurality of magnetron cathode segments is positioned in a unique vertical plane.

10. (Original) The plasma source of claim 1 wherein at least two of the plurality of magnetron cathode segments have different dimensions.

11. (Original) The plasma source of claim 1 wherein the switch comprises at least one insulated gate bipolar transistor (IGBT).

12. (Amended) The plasma source of claim ~~1~~ 5 wherein the power supply generates at least one voltage pulse in the train of voltage pulses that comprises a rise time and an amplitude that generates a weakly-ionized plasma and a strongly-ionized plasma from the sputtering target material atoms and feed gas without generating an arc discharge.

13. (Amended) The plasma source of claim ~~1~~ 5 wherein the power supply generates at least one voltage pulse in the train of voltage pulses that comprises a first rise time and a first

amplitude that generates a weakly-ionized plasma and a second rise time and a second amplitude that generates a strongly-ionized plasma from the sputtering target material atoms and feed gas.

14. (Original) The plasma source of claim 13 wherein the power supply generates at least one voltage pulse in the train of voltage pulses that comprises a rise time and a peak amplitude that shifts an electron energy distribution in the weakly-ionized plasma to energies that rapidly increase electron density in the weakly-ionized plasma so that a strongly-ionized plasma is formed.

15. (Original) The plasma source of claim 1 wherein the power supply generates at least one voltage pulse in the train of voltage pulses that comprises a rise time and an amplitude that generates a strongly-ionized plasma from the feed gas.

16. (Original) The plasma source of claim 1 further comprising at least two magnets that are positioned proximate to the plurality of magnetron cathode segments.

17. (Original) The plasma source of claim 16 wherein the at least two magnets generate an unbalanced magnetic field.

18. (Original) The plasma source of claim 1 further comprising a reactive gas source that is coupled to the chamber, the reactive gas source supplying reactive gas to the chamber.

19. (Original) The plasma source of claim 1 further comprising an excited atom source that is coupled to the chamber, the excited atom source supplying excited atoms to the chamber.

20. (Original) The plasma source of claim 19 wherein at least some of the excited atoms supplied by the excited atom source comprise metastable atoms.

21. (Original) The plasma source of claim 1 further comprising a pre-ionizing electrode that is positioned in the chamber, the pre-ionizing electrode generating a weakly-ionized plasma proximate to the segmented magnetron cathode.

22. (Original) The plasma source of claim 1 further comprising a controller that is electrically connected to the power supply, the controller determining the predetermined pulse sequence of the individual voltage pulses.

23. Cancelled

24. Cancelled

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44. Cancelled

45. (Currently Amended) An I-PVD source comprising:

a) means for confining a feed gas;

b) means for generating a train of voltage pulses, <u>at least one of a rise time, amplitude, pulse duration, fall time, and pulse shape of at least some of the voltage pulses in the train of voltage pulses being chosen to increase the generation of metal ions</u>;

c) means for applying a first voltage pulse in the train of voltage pulses to a first magnetron cathode segment of a concentrically positioned segmented magnetron cathode; and

d) means for applying a second voltage pulse in the train of voltage pulses to a second magnetron cathode segment of the concentrically positioned segmented magnetron cathode that is electrically isolated from the first concentrically positioned magnetron cathode segment, at least one of the first voltage pulse and the second voltage pulse generating a sustained plasma comprising metal ions from the concentrically positioned magnetron cathode segment material and the feed gas.

46. (New) The plasma source of claim 1 wherein at least two of the plurality of magnetron cathode segments have an unbalance magnetic field that increases a density of the plasma and a density of the metal ions in the plasma.